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(54)【発明の名称】　難燃性組成物

(57)【要約】

【目的】　耐酸性を向上せしめた難燃性組成物を提供する。

【構成】　水酸化マグネシウムを主成分とする天然鉱物を粉砕し、脂肪酸、脂肪酸金属塩、シランカップリング剤、チタネートカップリング剤より選ばれた少くとも１種を主成分とする表面処理剤で表面処理を施した後、プラスチック又はゴムに添加し、難燃性を付与すると共に耐酸性を向上せしめた難燃性組成物。

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【特許請求の範囲】

【請求項1】　水酸化マグネシウムを主成分とする天然鉱物を粉砕し、脂肪酸、脂肪酸金属塩、シランカップリング剤、チタネートカップリング剤より選ばれた少くとも1種を主成分とする表面処理剤で表面処理を施した後、プラスチック又はゴムに添加し、難燃性を付与すると共に耐酸性を向上せしめたことを特徴とする難燃性組成物。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明はノンハロゲン難燃電線、ケーブルの被覆材として使用される難燃性組成物に関するものである。

【0002】

【従来の技術及び発明が解決しようとする課題】電線ケーブルの燃焼時の発煙、毒性、腐食等の二次災害を防止する目的から、例えば特開平1-141929号公報に示されるように、被覆材に難燃性を付与する難燃剤の一つとして水酸化マグネシウムが使用されている。

【0003】従来より使用されている水酸化マグネシウムは、海水中のマグネシウムを原料とするものであり、これを難燃性として使用した難燃性組成物は、高湿度空気中に放置すると、材料表面に空気中の炭酸ガスと水酸化マグネシウムが反応した炭酸マグネシウムが析出したり、酸性溶液中に浸漬すると水酸化マグネシウムが溶出して耐酸性に劣るという問題があった。

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【0004】

【課題を解決するための手段】本発明は上述の問題点を解消し耐酸性を向上せしめた難燃性組成物を提供するもので、その特徴は、水酸化マグネシウムを主成分とする天然鉱物を粉砕し、脂肪酸、脂肪酸金属塩、シランカップリング剤、チタネートカップリング剤より選ばれた少くとも1種を主成分とする表面処理剤で表面処理を施した後、プラスチック又はゴムに添加し、難燃性を付与すると共に、耐酸性を向上せしめた難燃性組成物にある。

【0005】

【作用】上述の問題を解決するため、種々の水酸化マグネシウムを用い検討を行なったところ、水酸化マグネシウムを主成分とする天然鉱物を原料とした水酸化マグネシウムが耐酸性にすぐれていることを見出した。このメカニズムに関しては不明であるが、結晶構造等が従来品と異なっているためではないかと思われる。

【0006】

【実施例】表1に示す各種材料を6インチオープンロールで15分混練した後、約1㎜厚×13cm幅×17cm長さのシートに約 160℃×10分加圧成形してシートを作成した。このシートを用いて耐炭酸ガス性及び耐塩酸性を評価した。結果は表1の通りである。

【0007】

【表1】

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	比較例1	比較例2	実施例1	実施例2	実施例3
EEA	100	100	100	100	100
カーボン	3	3	3	3	3
水酸化マグネシウム	A 140	B 140	C 140	D 140	E 140
酸化防止剤	0.5	0.5	0.5	0.5	0.5
加工助剤	0.5	0.5	0.5	0.5	0.5
耐炭酸ガス性	1.5wt%増	2.0	1.0	1.2	1.2
耐塩酸性	-0.7wt%減	-1.0	-0.2	-0.2	-0.2

（注）EEA：　EA含有量23wt%，MI＝0.5
例：日本ユニカーWN－170

A　：　従来（海水法）の水酸化マグネシウム
例：協和化学キスマ5A

B　：　従来（海水法）の水酸化マグネシウム
例：協和化学キスマ5B

C　：　天然鉱物（ブルーサイト）を原料として脂肪酸で表面処理した水酸化マグネシウム
例：神島化学N－1

D　：　同上をシランカップリング剤で処理した水酸化マグネシウム

F　：　同上をチタネートカップリング剤で処理した水酸化マグネシウム

【0008】耐炭酸ガス性：試料として厚1mm×幅2cm×長さ13mmの短冊状試料を上述のシートより打ち抜き、湿度90%以上のデシケーター中に炭酸ガスを200cc/分の割合で流し込み、48時間の重量変化を測定した。比較例1，2に示す従来の水酸化マグネシウムを使用したものは、重量増加が1.5～2wt%と大きく、表面に炭酸マグネシウムの白色結晶が多量析出しているのに対し、天然鉱物の水酸化マグネシウムを使用した実施例1～3は、重量増加が1.0～1.2wt %と小さく、表面への白色物析出割合も少量であった。

【0009】耐塩酸性：厚1mm×幅3cm×長さ6cmの試料をpH2の塩酸水溶液中に6時間浸漬し、重量変化を測定した。

比較例1，2は0.7～1.0wt %の重量減が認められ、相当量の水酸化マグネシウムが試料から塩酸中に溶出しているのに対し、実施例1～3は重量減が0.2wt%と極めて少くなく、耐塩酸性にすぐれていることが認められた。

【0010】以上は材料としてEEAを使用した場合を示したが、エチレンプロピレンゴム、アクリルゴム、超低密度ポリエチレン、直鎖状低密度ポリエチレン、エチレンビニルアセテート、エチレンメタアクリレート、エチレンメチルメタアクリレート等のゴム、プラスチック材料においても、又これらの混合物に対しても同様の効果が認められ、天然鉱物を原料とした水酸化マグネシウムが耐炭酸ガス性、耐塩酸性等の耐酸性にすぐれていることが確認された。

【0011】

【発明の効果】以上説明したように、本発明の難燃性組成物によれば、耐酸性にすぐれており、特に高湿度雰囲気に使用されるノンハロゲン難燃電線ケーブルに適用すると効果的である。

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(54) [Title of the Invention] **Flame-Resistant Composition**

(57) [Summary]

[Object] To provide a flame-resistant composition with improved acid resistance.

[Structure] A flame-resistant composition endowed with flame resistance and improved acid resistance, and by being obtained by a process in which a natural mineral containing magnesium hydroxide as its principal component is pulverized, is surface-treated with a surface treatment agent containing at least one compound selected from among fatty acids, salts of fatty acids with metals, silane coupling agents, and titanate coupling agents as its principal component, and is added to a plastic or rubber.

[Claims]

[Claim 1] A flame-resistant composition, characterized by being endowed with flame resistance and improved acid resistance, and by being obtained by a process in which a natural mineral containing magnesium hydroxide as its principal component is pulverized, is surface-treated with a surface treatment agent containing at least one compound selected from among fatty acids, salts of fatty acids with metals, silane coupling agents, and titanate coupling agents as its principal component, and is added to a plastic or rubber.

[Detailed Description of the Invention]

[0001]
[*Field of Industrial Utilization*]

The present invention relates to a flame-resistant composition used as a coating material on nonhalogen flame-resistant electric wires and cables.

[0002]
[*Prior Art, and Problems Which the Invention Is Intended to Solve*]

As described, for example, in Japanese Laid-Open Patent Application 1-141929, magnesium hydroxide is used as a flame retardant for endowing coating materials with flame resistance in order to prevent electric wires and cables from emitting smoke or toxic substances, undergoing corrosion, or creating other secondary hazards during burning.

[0003] The magnesium hydroxide used in the past has been disadvantageous in that magnesium contained in sea water is used as the starting material, and when a flame-resistant composition obtained using this starting material in order to achieve flame resistance is allowed to stand in humid air, magnesium carbonate produced by the reaction between magnesium hydroxide and the carbon dioxide in the air is deposited on the surface of the material, with the result being that when [the product] is immersed in an acid solution, the magnesium hydroxide dissolves and the acid resistance decreases.

[0004]

[*Means Used to Solve the Above-Mentioned Problems*]

The present invention provides a flame-resistant composition in which the aforementioned problems are overcome and which is endowed with improved acid resistance. The distinctive feature of the present invention is a flame-resistant composition that is endowed with flame resistance and improved acid resistance and that is obtained by a process in which a natural mineral containing magnesium hydroxide as its principal component is pulverized, is surface-treated with a surface treatment agent containing at least one compound selected from among fatty acids, salts of fatty acids with metals, silane coupling agents, and titanate coupling agents as its principal component, and is added to a plastic or rubber.

[0005]

[*Effect of the Invention*]

As a result of research aimed at addressing the aforementioned problems and conducted using various types of magnesium hydroxide, it was discovered that excellent acid resistance is provided by a magnesium hydroxide obtained using a starting material in the form of a natural mineral containing magnesium hydroxide as its principal component. Although the mechanism of this phenomenon is not yet clear, one possible explanation is that [the composition] is different from conventional products in terms of crystal structure or the like.

[0006]

[Practical Examples]

The materials shown in Table 1 were kneaded for 15 minutes with 6-inch open rollers and pressure-molded for 10 minutes at about 160°C into sheets with a thickness of about 1 mm, a width of 13 cm, and a length of 17 cm. These sheets were used to evaluate resistance against carbon dioxide and resistance against hydrochloric acid. The results are shown in Table 1.

[0007]

[Table 1]

	Comparative Example 1	Comparative Example 2	Practical Example 1	Practical Example 2	Practical Example 3
EEA	100	100	100	100	100
Carbon	3	3	3	3	3
Magnesium hydroxide	A 140	B 140	C 140	D 140	E 140
Antioxidant	0.5	0.5	0.5	0.5	0.5
Processing aid	0.5	0.5	0.5	0.5	0.5
Resistance against carbon dioxide	1.5 wt% increase	2.0	1.0	1.2	1.2
Resistance against hydrochloric acid	0.7 wt% reduction	-1.0	-0.2	-0.2	-0.2

Notes: EEA contains 23 wt% EA and has an MI of 5 (example: WN-170 by Nippon Unicar)

A is a conventional magnesium hydroxide (sea water method) (example: Kisuma 5A by Kyowa Kagaku)

B is a conventional magnesium hydroxide (sea water method) (example: Kisuma 5B by Kyowa Kagaku)

C is a magnesium hydroxide obtained by the surface treatment with a fatty acid of a natural mineral (brucite) used as the starting material (example: N-1 by Kamishima Kagaku)

D is a magnesium hydroxide obtained by treating the same mineral with a silane coupling agent

F is a magnesium hydroxide obtained by treating the same mineral with a titanate coupling agent

[0008] Resistance against carbon dioxide Samples shaped as strips with a thickness of 1 mm, a width of 2 cm, and a length of 13 mm were cut from the aforementioned sheets, carbon dioxide was passed at a rate of 200 cc/min through a desiccator with a humidity of 90% or higher, and the change in weight was measured 48 hours later. Whereas products obtained using conventional magnesium hydroxide (Comparative Examples 1 and 2) increased their weight by 1.5 to 2 wt%, and large amounts of magnesium hydroxide white crystals had deposited on the surface, products obtained using the magnesium hydroxide of a natural mineral (Practical Examples 1 through 3) increased their weight by a mere 1.0 to 1.2 wt%, and the rate at which a white substance deposited on the surface was low.

[0009] Resistance against hydrochloric acid Samples with a thickness of 1 mm, a width of 3 cm, and a length of 6 cm were immersed for 6 hours in an aqueous solution of hydrochloric acid (pH: 2), and the change in weight was measured.

Whereas the samples in Comparative Examples 1 and 2 reduced their weight by 0.7 to 1.0 wt%, and substantial amounts of the magnesium hydroxide in the samples had dissolved in the hydrochloric acid, the samples in Practical Examples 1 through 3 reduced there weight by a scant 0.2 wt%, displaying excellent resistance against hydrochloric acid.

[0010] Although the above description involves cases in which EEA was used as the material, the same effect can be obtained using ethylene-propylene rubber, acrylic rubber, very-low-density polyethylene, low-density linear polyethylene, ethylene vinyl acetate, ethylene methacrylate, ethylene methyl methacrylate, and other rubber or plastic materials, used either individually or as mixtures. It has thus been confirmed that magnesium hydroxide obtained using a natural mineral as the starting material is highly resistant to carbon dioxide, hydrochloric acids, and other acids.

[0011]

[Merits of the Invention]

As described above, the flame-resistant composition of the present invention has excellent acid resistance and, in particular, is effective for use with nonhalogen flame-resistant electric wires and cables operating in humid environments.